INSTRUCTIONS

You are hired as an IT Manager for BeyondTech that is currently based in head office (Gauteng), due to its growth you are informed by the CEO that the company will need to open new branches to the following provinces:
- Gauteng (15 users), with the following Organizational units: 5 Employees in IT Department, 5 Employees in HR Department and 5 Employees in Procurement Department.
- Cape Town (5 users)
- Free State (5 users)
- Eastern Cape (5 users)

Please take a note that the head office does not have a network and server infrastructure for communication purpose and there are only 15 employees including the CEO.

Solution

To address the requirements, I propose the following network design and implementation plan for TechSolutions Inc.:

Network Topology and Diagram

1. **Head Office (Gauteng)**:
    - **Servers**
    - **Internetworking Devices**
    - **Cabling**
    - **IP Addressing**: Assign private IP addresses using a subnetted network to organize departments.

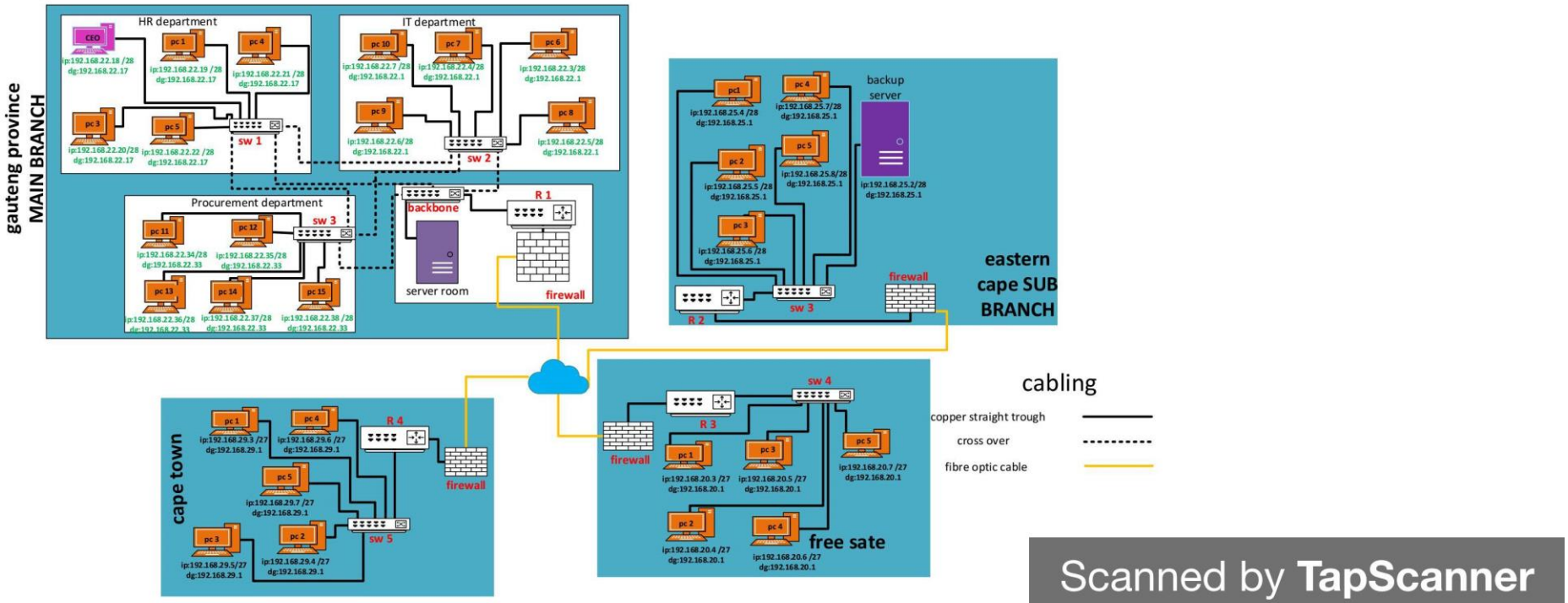
2. **Cape Town, Free State, and Eastern Cape Branches**:

- **Servers**:
- **Internetworking Devices**:
- **Cabling**:
- **IP Addressing**: Assign unique subnets for each branch.

3. **WAN and Internet Connectivity**:

- Use public IP addresses for WAN connections between branches and the head office.
- Implement VPN for secure communication between branches.

Topology diagram



NETWORK IP ADDRESS TABLE

PROVINCE	DEPARTMENT	DEVICE	INTERFACE	IP ADDRESS	SUBNET MASK	DEFAULT GATEWAY
GAUTENG	HR	ROUTER		192.168.22.1	255.255.255.240	N/A
				192.168.22.17	255.255.255.240	
				192.168.22.33	255.255.255.240	
				192.168.22.49	255.2555.255.240	
		PC 1	Fa/0	192.168.22.18	255.255.255.240	192.168.22.17
		CEO	Fa/0	192.168.22.19	255,255.255.240	192.168.22.17
		PC 3	Fa/0	192.168.22.20	255.255.255.240	192.168.22.17
		PC 4	Fa/0	192.168.22.21	255.255.255.240	192.168.22.17
		PC 5	Fa/0	192.168.22.22	255.255.255.240	192.168.22.17
	IT	SERVER	Fa/0	192.168.22.2	255.255.255.240	192.168.22.1
		PC 6	Fa/0	192.168.22.3	255.255.255.240	192.168.22.1
		PC 7	Fa/0	192.168.22.4	255.255.255.240	192.168.22.1
		PC 8	Fa/0	192.168.22.5	255.255.255.240	192.168.22.1
		PC 9	Fa/0	192.168.22.6	255.255.255.240	192.168.22.1
		PC 10	Fa/0	192.168.22.7	255.255.255.240	192.168.22.1
	PROCURMENT	PC 11	Fa/0	192.168.22.34	255.255.255.240	192.168.22.33
		PC 12	Fa/0	192.168.22.35	255.255.255.240	192.168.22.33
		PC 13	Fa/0	192.168.22.36	255.255.255.240	192.168.22.33
		PC 14	Fa/0	192.168.22.37	255.255.255.240	192.168.22.33
		PC 15	Fa/0	192.168.22.38	255.255.255.240	192.168.22.33
EASTERN CAPE.		Router		192.168.25.1	255.255.255.240	N/A
		Backup server	Fa/0	192.168.25.2	255.255.255.240	192.168.25.1
		PC 1	Fa/0	192.168.25.3	255.255.255.240	192.168.25.1
		PC 2	Fa/0	192.168.25.4	255.255.255.240	192.168.25.1
		PC 3	Fa/0	192.168.25.5	255.255.255.240	192.168.25.1
		PC 4	Fa/0	192.168.25.6	255.255.255.240	192.168.25.1
		PC 5	Fa/0	192.168.25.7	255.255.255.240	192.168.25.1

CAPETOWN		Router		192.168.29.2	255.255.255.240	N/A
		PC 1	Fa/0	192.168.29.3	255.255.255.240	192.168.29.1
		PC 2	Fa/0	192.168.29.4	255.255.255.240	192.168.29.1
		PC 3	Fa/0	192.168.29.5	255.255.255.240	192.168.29.1
		PC 4	Fa/0	192.168.29.6	255.255.255.240	192.168.29.1
		PC 5	Fa/0	192.168.29.7	255.255.255.240	192.168.29.1
FREE STATE		Router		192.168.20.2	255.255.255.240	N/A
		PC 1	Fa/0	192.168.20.3	255.255.255.240	192.168.20.1
		PC 2	Fa/0	192.168.20.4	255.255.255.240	192.168.20.1
		PC 3	Fa/0	192.168.20.5	255.255.255.240	192.168.20.1
		PC 4	Fa/0	192.168.20.6	255.255.255.240	192.168.20.1
		PC 5	Fa/0	192.168.20.7	255.255.255.240	192.168.20.1

INTERMEDIARY DEVICE INTERFACE DETAILS

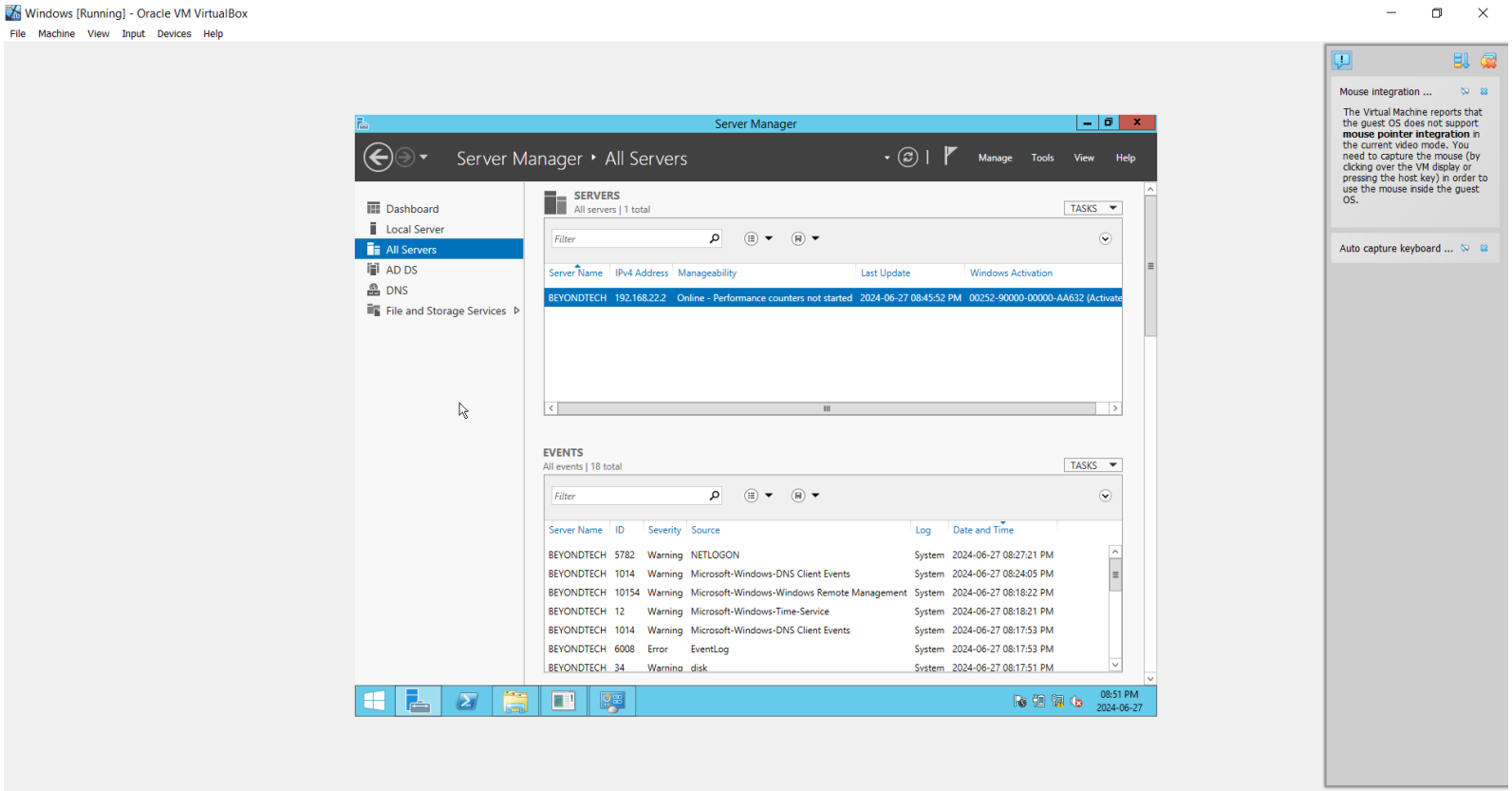
PROVICE	DEVICE NAME	PORT RANGE	STATUS	VLAN	DESTINATION:PORT	VTP MODE	VTP DOMAIN	VTP PASSWORD
GAUTENG	R1		UP	TRUNK	BACKBONE : G0/1	N/A	N/A	N/A
			UP	NA	FIREWALL	N/A	N/A	N/A
	backbone	FA/6-10	DOWN	20	N/A	SERVER	BeyondTech	Group#2
		FA/1-5	DOWN	10	N/A			
		FA/11-15	DOWN	30	N/A			
		G0/1	UP	TRUNK	R1:G0/1			
		G0/2	UP	10	SERVER : FA0/1			
		FA/21	UP	TRUNK	SW1 : FA/21			
		FA/22-23,19	DOWN	TRUNK	N/A			
		FA/24	UP	TRUNK	SW2 : FA/24			
		Fa/25	UP	TRUNK	SW3 : FA/25			
	SW 1	FA/6-10	UP	20	HR DEVICES	CLIENT		
		FA/21	UP	TRUNK	Backbone : FA/21			
		FA/22	UP	TRUNK	SW 2 :FA/22			
		FA/23	UP	TRUNK	SW 3 : FA23			

	SW 2	FA/1-5	UP	10	IT DEVICES	CLIENT		
		FA/22	UP	TRUNK	SW1 : FA/22			
		FA/24	UP	TRUNK	Backbone : fa/24			
		FA/19	UP	TRUNK	SW3 : FA/19			
	SW 3	FA/23	UP	TRUNK	SW1 : FA/23	CLIENT		
		FA/25	UP	TRUNK	BACKBONE :FA/25			
		FA/11-15	UP	30	Pd devices			
		FA/19	UP	TRUNK	SW2 : FA/19			
Free state	R 3	G0/1	UP	1	SW4 : G0/1	N/A	N/A	N/A
		Fibre	up	1	internet	N/A	N/A	N/A
	SW 4	G0/1	UP	1	R3 : G0/1	N/A	N/A	
		FA0/1-5	UP	1	PC(S)	N/A	N/A	N/A
capetown	R4	G0/1	up	1	SW5 : g0/1	N/A	N/A	N/A
		fibre	up	1	internet	n/a	n/a	n/a
	SW 5	G0/1	up	1	R4 : g0/5	n/a	n/a	n/a
		Fa0/1-5	up	1	Pc(s)	n/a	n/a	n/a
Eastern cape	R2	G0/1	UP	1	SW 3 : G0/1	N/A	N/A	N/A
		Fibre	Up	1	Internet	n/a	n/a	n/a
	SW 3	G0/1	up	1	R2 : g0/1	n/a	n/a	n/a
		G0/2	Up	1	backupServer:g0/2	n/a	n/a	n/a
		Fa0/1-5	Up	1	Pc(s)	n/a	n/a	n/a

Technical skills demonstration

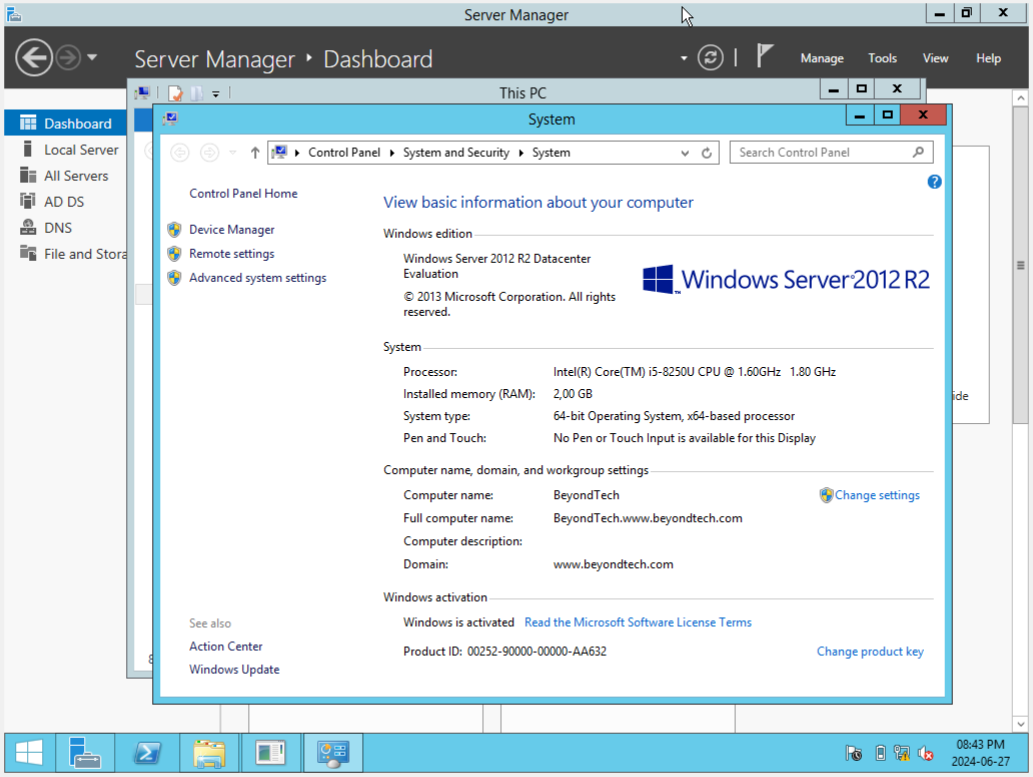
Virtual machine was used to configure the following:

1.Installing the domain for the company at the head office



Windows [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help



Mouse integration ...

The Virtual Machine reports that the guest OS does not support **mouse pointer integration** in the current video mode. You need to capture the mouse (by clicking over the VM display or pressing the host key) in order to use the mouse inside the guest OS.

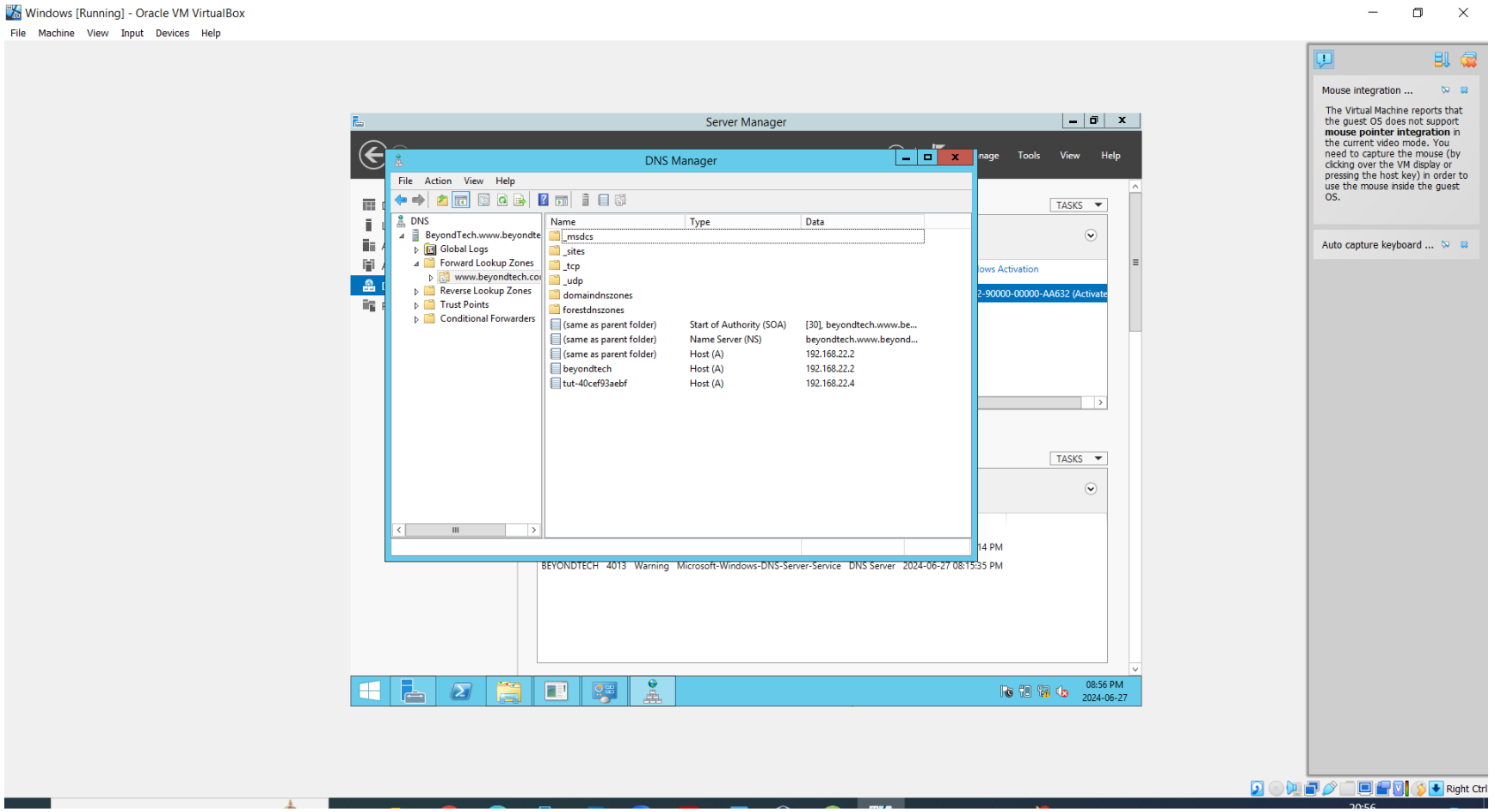
Auto capture keyboard ...

English (United States)
US keyboard

To switch input methods, press Windows key+Space.

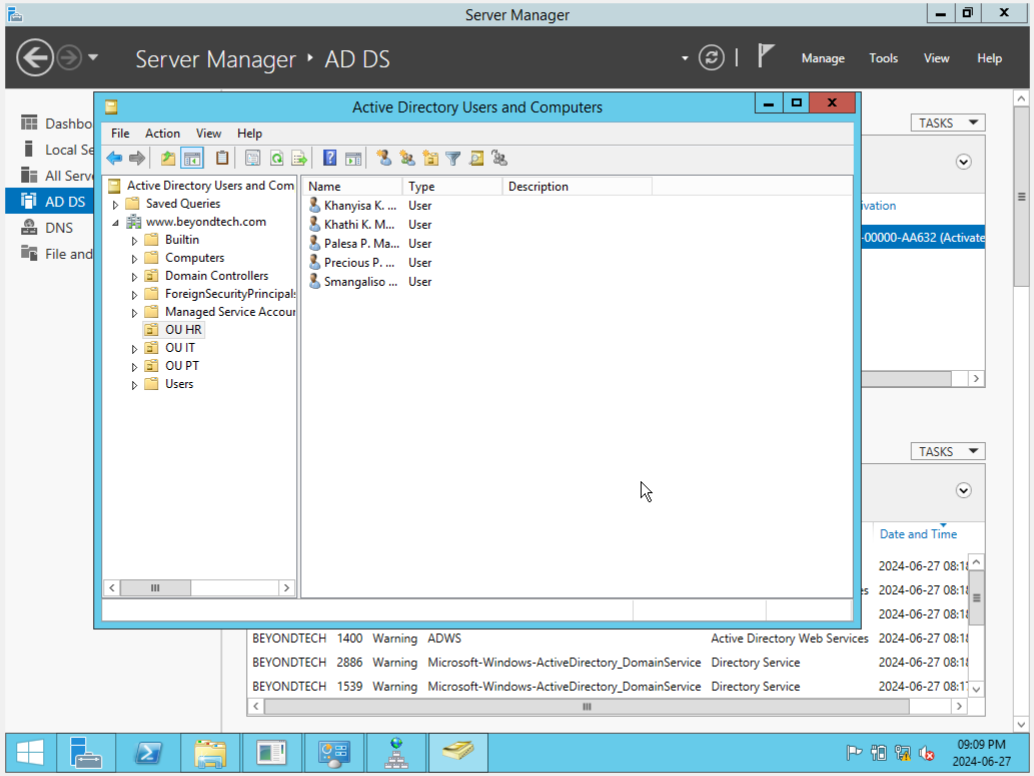
Right Ctrl

2.Creating and configuring objects with organizational units.As stated above,each department must each have 5 users.



Windows [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help



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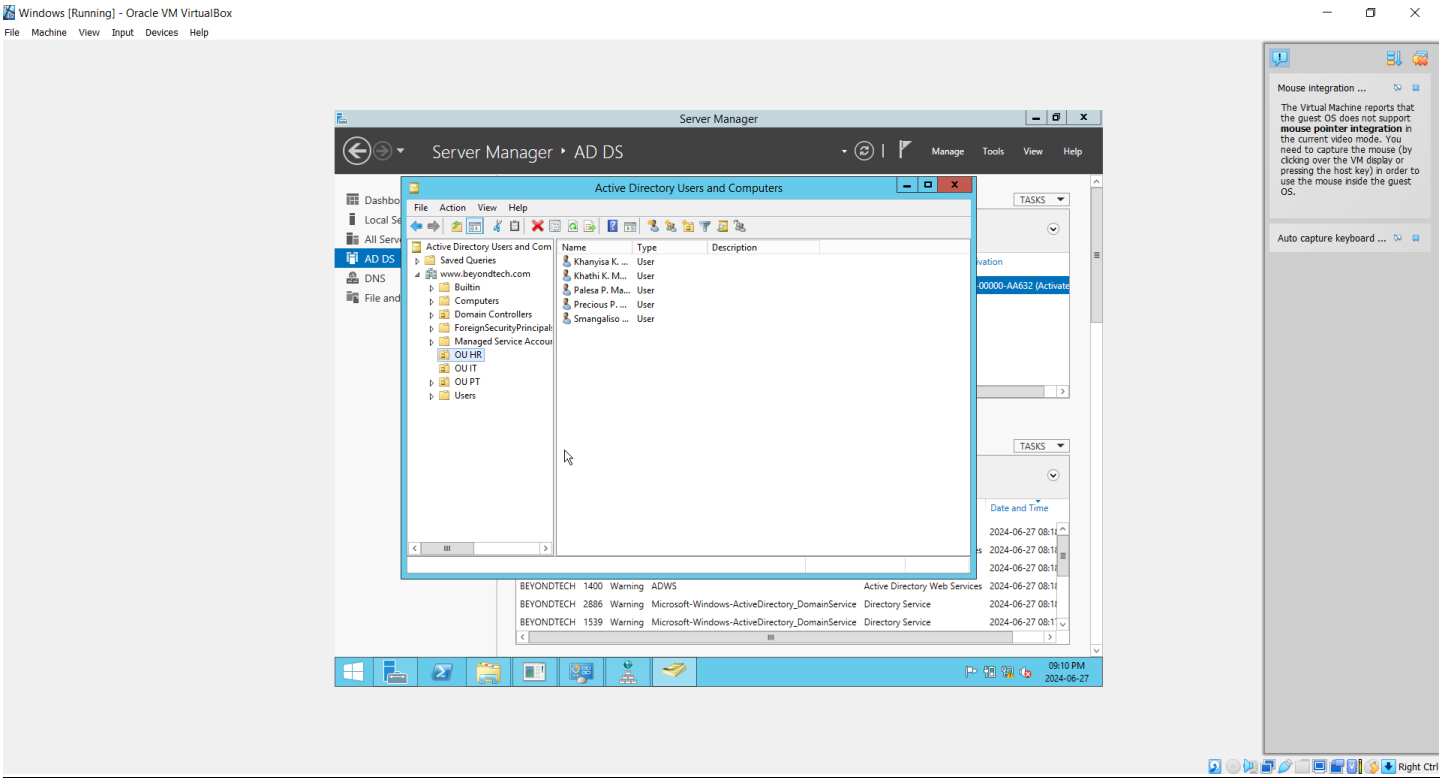
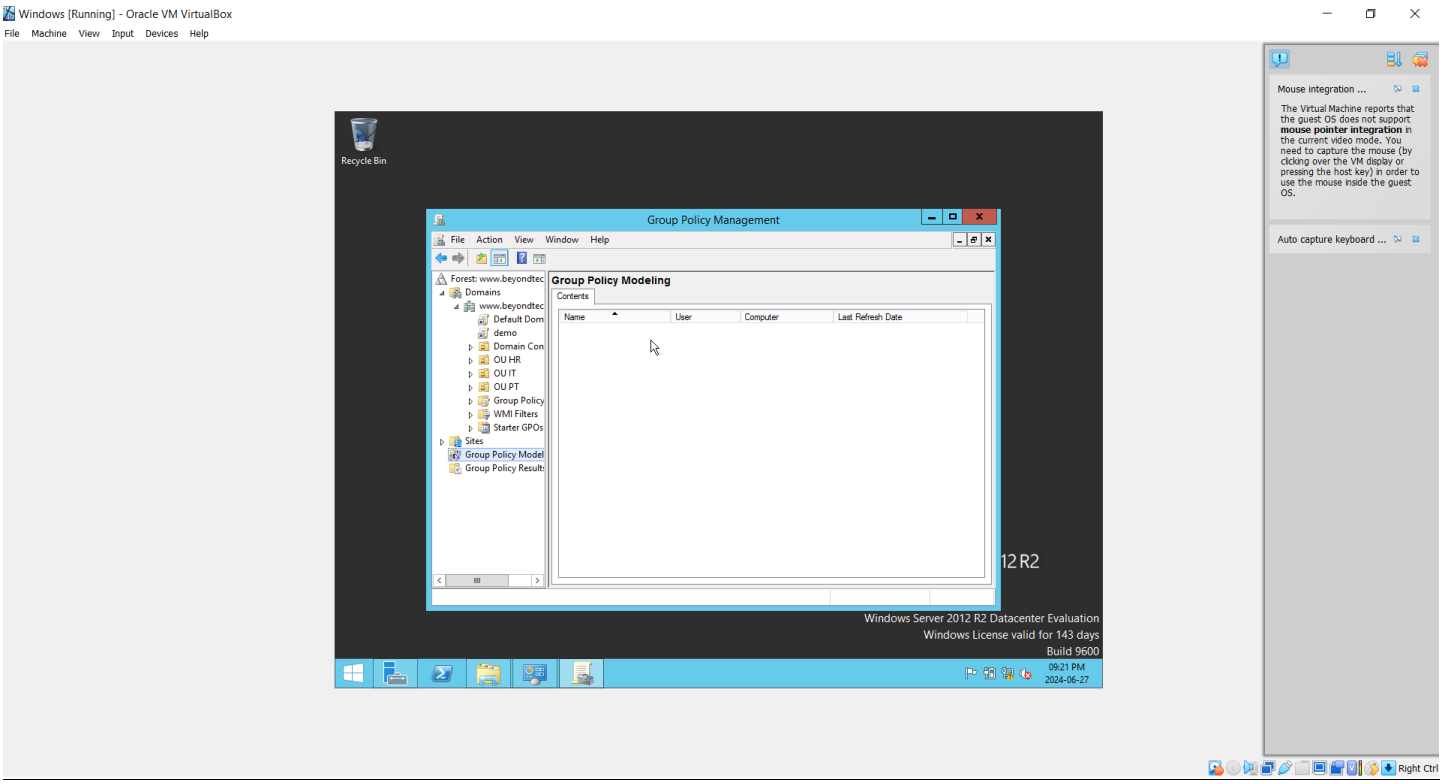
Auto capture keyboard ...

Right Ctrl



3.Creating system policies and home drives for employees in HR department


Windows [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Recycle Bin
Group Policy Management
File Action View Window Help
Forest: www.beyondtec
Domains
www.beyondtec
Default Dom
demo
Domain Con
OU HR
OU IT
OU PT
Group Policy
WMI Filters
Starter GPOs
Sites
Group Policy Model
Group Policy Results
Group Policy Modeling
Contents
Name
User
Computer
Last Refresh Date
12 R2
Windows Server 2012 R2 Datacenter Evaluation
Windows License valid for 143 days
Build 9600
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Auto capture keyboard ...
Right Ctrl

Reference and Citation:

1.Vincent Tech Boy's. (2014, April 8) *NEW* Configuring Group Policy on Windows Server 2012 (Complete) YouTube. https://www.youtube.com/watch?v=gsRPmqqFpGI

2. Red Hat, Inc. (2021) What is network virtualization? https://www.redhat.com/en/topics/virtualization/what-is-network-virtualization

3. Murugiah Souppaya, John Morello, and Karen Scarfone.(2016) Secure Virtual Network Configuration for Virtual Machine (VM) Protection https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-125B.pdf

4. Md. Faizul Bari, Mohammad Mahfuzul Islam, and Reaz Ahmed.(2016) Virtual network security: threats, countermeasures, and challenges https://jisajournal.springeropen.com/articles/10.1186/s13174-016-0054-z